

CLAIMS:

1. An optical scanning device (1) for scanning an optical record carrier (2) comprising an information layer (4), the device comprising:
 - a radiation source (9) for emitting an incident radiation beam (7);
 - a detection system comprising an information signal detector (25) arranged to receive radiation reflected from the information layer and to detect an information signal therein;
 - an optical system (14, 12) for focusing the incident radiation beam to a spot on in the record carrier, and for directing the reflected radiation beam onto the information signal detector; and
- 10 an optical wavefront modifier (10) arranged in the path of the incident radiation beam and the reflected radiation beam,
 - wherein the incident radiation beam has a first wavefront shape at a given location prior to its incidence on the optical wavefront modifier and the reflected radiation beam has a second wavefront shape at the said given location after passing through the optical wavefront modifier,
 - characterised in that the optical wavefront modifier is arranged to perform wavefront modification on the incident and reflected radiation beams such that the second wavefront shape is substantially different to the first wavefront shape.
- 20 2. A device according to claim 1, wherein the optical path length between the information layer and the detection system is less than the optical path length between the radiation source and the information layer.
3. A device according to claim 1 or claim 2, wherein the optical wavefront modifier is arranged to provide a focus servo wavefront modification which is arranged to generate a focus servo signal at the detection system.
- 25 4. A device according to claim 3, wherein the optical wavefront modifier is arranged to provide an astigmatic wavefront modification.

5. A device according to claim 3, wherein the optical wavefront modifier is arranged to split the reflected radiation beam into two sub beams, thereby providing a beam splitting wavefront modification.

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6. A device according to any one of the preceding claims, wherein the optical wavefront modifier is arranged to provide a focusing wavefront modification which is arranged to at least partly focus the reflected radiation beam onto the detection system.

10 7. A device according to claim 6 when dependent on claim 5, wherein the optical wavefront modifier includes a double wedge structure having a profile (601, 602) along at least part of a surface thereof.

15 8. A device according to any one of the preceding claims, wherein the optical wavefront modifier comprises a birefringent part (303) arranged to vary the optical path of an incoming radiation beam in dependence on the polarization of the incoming radiation beam.

20 9. A device according to claim 8, wherein the index of refraction of the birefringent part varies in accordance with the polarization of radiation passing therethrough, and is arranged such that the optical wavefront modifier applies zero modification to the incident radiation beam.

25 10. A device according to claim 8 or claim 9, wherein the birefringent part comprises a liquid crystal material enclosed between optically homogeneous plates (301, 305).

11. A device according to any one of the preceding claims, wherein the optical wavefront modifier is positioned in a substantially collimated portion of the incident radiation beam.

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12. A device according to any one of the preceding claims, including a polarisation-altering element (14A) located between the optical wavefront modifier and the optical record carrier, in the path of the incident and reflected radiation beams.

13. An optical wavefront modifier (10) for use in an optical scanning device (1) for scanning an optical record carrier (2) comprising an information layer (4), the device comprising

a radiation source (9) for emitting an incident radiation beam (7);

5 a detection system comprising an information signal detector (25) arranged to receive radiation reflected from the information layer and to detect an information signal therein;

10 an optical system (14, 12) for focusing the incident radiation beam to a spot on in the record carrier, and for directing the reflected radiation beam onto the information signal detector,

15 wherein the optical wavefront modifier (10) is positionable in the path of the incident radiation beam and the reflected radiation beam such that the incident radiation beam has a first wavefront shape at a given location prior to its incidence on the optical wavefront modifier and the reflected radiation beam has a second wavefront shape at the said given location after passing through the optical wavefront modifier,

characterised in that the optical wavefront modifier is arranged to perform wavefront modification on the incident and reflected radiation beams such that the second wavefront shape is substantially different to the first wavefront shape.